NC-SMQ®230 Pb-Free Solder Paste

Benefits

- Minimum peak temperature 229°C
- Wide reflow process window
- Consistent fine pitch print deposition
- Excellent start-up after idle time
- Long stable tack life and open time

Introduction

NC-SMQ®230 is an air reflow, no-clean solder paste specifically formulated to accommodate the higher processing temperatures required by the Sn/Ag/Cu, Sn/Ag/Bi, Sn/Ag, and other Pb-Free alloy systems favored by the electronics industry to replace conventional Pb- bearing solders. **NC-SMQ®230** offers consistent, repeatable printing performance combined with long stencil and tack times to handle the rigors of today's high-speed as well as high-mix surface mount lines.

Alloys

Indium Corporation manufactures low oxide spherical powder composed of a variety of Pb-Free alloys that cover a broad range of melting temperatures. The metal load required is application dependent and will vary with alloy density and mesh size. Type 3 (-325/+500 mesh) powder is standard, but other powder sizes are available. See Standard Product Specifications section for details on metal load and particle size.

Standard Product Specifications

Alloy	Metal Load	IPN
96.5Sn/3.0Ag/0.5Cu (SAC305)	89.3% Printing (Type 3)	83495
96.5Sn/3.8Ag/0.7Cu (SAC387)	89.3% Printing (Type 3)	82797
96.5Sn/3.0Ag/0.5Cu (SAC305)	89.3% Printing (Type 4)	83809

Packaging

Standard packaging for stencil printing applications includes 4 oz. jars and 6 oz. or 12 oz. cartridges. Packaging for enclosed print head systems is also readily available. For dispensing applications, 10cc and 30cc syringes are standard. Other packaging options may be available upon request.

Storage and Handling Procedures

Refrigerated storage will prolong the shelf life of solder paste. The shelf life of **NC-SMQ®230** is 6 months when stored at <10°C. Solder paste packaged in syringes and cartridges should be stored tip down.

Solder paste should be allowed to reach ambient working temperature prior to use. Generally, paste should be removed from refrigeration at least two hours before use. Actual time to reach thermal equilibrium will vary with container size. Paste temperature should be verified before use. Jars and cartridges should be labeled with date and time of opening.

Material Safety Data Sheets

The MSDS for this product can be found online at http://www.indium.com/techlibrary/msds.php

OVER→

BELLCORE AND J-STD TESTS & RESULTS

Test	Result
J-STD-004 (IPC-TM-650)	
• Flux Type Classification	ROL1
• Flux Induced Corrosion (Copper Mirror)	Pass
• Presence of Halide Silver Chromate	Pass
Fluoride Spot Test	Pass
• Post Reflow Flux Residue (ICA Test)	42%
• Corrosion	Pass
• SIR	Pass
• Acid Value	99.6

Test	Result
J-STD-005 (IPC-TM-650)	
• Typical Solder Paste Viscosity SAC305 (Sn96.5/Ag3/Cu0.5, Type 3, 89.3%) SAC387 (Sn95.5/Ag3.8/Cu0.7, Type 3, 89.3%) Malcom (10 rpm),	2100 poise
• Thixotropic Index; SSF (ICA Test)	-0.475
• Slump Test	Pass
• Solder Ball Test	Pass
• Typical Tackiness	48 grams
• Wetting Test	Pass
BELLCORE GR-78	
• SIR	Pass
• Electromigration	Pass

All information is for reference only. Not to be used as incoming product specifications.

Form No. 97722 (A4) R13

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ISO 9001 REGISTERED

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Printing

Stencil Design:

Electroformed and laser cut/electropolished stencils produce the best printing characteristics among stencil types. Stencil aperture design is a crucial step in optimizing the print process. The following are a few general recommendations:

- Discrete components — A 10-20% reduction of stencil aperture has significantly reduced or eliminated the occurrence of mid-chip solder beads. The "home plate" design is a common method for achieving this reduction.
- Fine pitch components — A a surface area reduction is recommended for apertures of 20 mil pitch and finer. This reduction will help minimize solder balling and bridging that can lead to electrical shorts. The amount of reduction necessary is process dependent (5-15% is common).
- For adequate release of solder paste from stencil aperatures, a minimum aspect ratio of 1.5 is required. The aspect ratio is defined as the width of the aperture divided by the thickness of the stencil.

Printer Operation:

The following are general recommendations for stencil printer optimization. Adjustments may be necessary based on specific process requirement:

- Solder Paste Bead Size: 20-25mm diameter
- Print Speed: 25-50mm
- Squeegee Pressure: 0.018-0.027kg/mm of blade length
- Underside Stencil Wipe: Once every 10-25 prints
- Solder Paste Stencil Life: >8 hrs. @ 30-60% RH & 22°-28°C

Cleaning

NC-SMQ®230 is designed for no-clean applications, however the flux can be removed if necessary by using a commercially available flux residue remover.

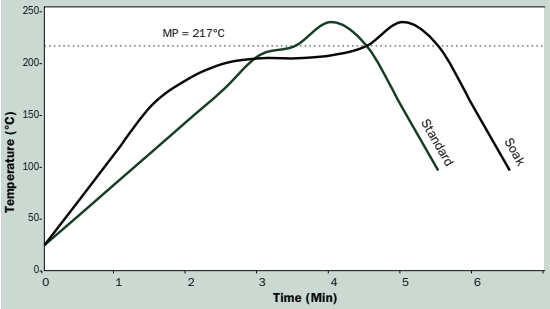
Stencil Cleaning is best performed using isopropyl alcohol (IPA) as a solvent. Most commercially available stencil cleaners work well.

Compatible Products

- Rework Flux: TACFlux 023
- Flux Pen: FP-500
- Wave Flux: WF-7742, WF-9942

Reflow

Recommended Profile:



The stated profile recommendations apply to most Pb-Free alloys in the Sn/Ag/Cu (SAC) alloy system, including SAC 305 (96.5Sn/3.0Ag/0.5Cu). This can be used as a general guideline in establishing a reflow profile when using **NC-SMQ®230** Solder Paste. Deviations from these recommendations are acceptable, and may be necessary, based on specific process requirements, including board size, thickness & density.

Heating Stage:

A linear ramp rate of 0.5°- 2.0°C/second allows gradual evaporation of volatile flux constituents and helps minimize defects such as solder balling and/or beading and bridging resulting from hot slump. It also prevents unnecessary depletion of fluxing capacity when a high peak temperature and extended time above liquidus is used. A profile with a soak between 200°-210°C for up to 2 minutes can be implemented to reduce void formation on BGA & CSP type devices. A short soak of 20-30 seconds just below the melting point of the solder can help minimize tombstoning.

Liquidus Stage:

A peak temperature of 12° to 43°C above the melting point of the solder alloy is recommended to achieve acceptable wetting and form a quality solder joint. The time above liquidus (TAL) should be 30–90 seconds. A peak temperature and TAL above these recommendations can result in excessive intermetallic formation that can decrease solder joint reliability.

Cooling Stage:

A rapid cool down (4-6°C/second) is desired to form a fine grain structure. Slow cooling will form a large grain structure, which typically exhibits poor fatigue resistance.

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